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REPORT

June 2022

TOWN OF

Shrewsbury

MASSACHUSETTS

Massachusetts MS4 Permit Compliance
Green Infrastructure Report

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ATTACHMENTS

Attachment A – Regulatory Review Matrix

1.0 INTRODUCTION

1.1 Regulatory Requirement

The 2016 Massachusetts Municipal Separate Storm Sewer Systems (MS4) General Permit, which came into effect on July 1, 2018, regulates discharges from small MS4s to waters of the United States. The Permit requires MS4 operators to develop, implement, and enforce a stormwater management program (SWMP). The purpose of the SWMP is to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the applicable water quality requirements of the Clean Water Act. MS4 operators must implement various Best Management Practices (BMPs) for each of the following six minimum control measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Stormwater Management in New Development and Redevelopment (Post-Construction Stormwater Management)
- Good Housekeeping and Pollution Prevention for Municipal Operations

As part of the minimum control measure for Post-Construction Stormwater Management, Section 2.3.6 of the 2016 MS4 Permit, regulated communities are required to assess existing local regulatory mechanisms to determine the feasibility of making the following practices allowable when appropriate site conditions exist:

- Green roofs
- Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and nature-based stormwater management practices
- Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses
- Open space preservation or cluster development practices

The purpose of this exercise is to determine if these practices are allowed or, if not, what regulatory mechanisms hinder the use of these practices. This report will recommend any changes to local regulations necessary to make these practices allowable and will include a schedule for implementing those recommendations.

The Town of Shrewsbury shall implement recommendations included in this report in the specified timeframe, where recommendations are feasible and where the timeframe outlined is sufficient. The status of this assessment and any planned or completed changes to the relevant regulatory mechanisms shall be reported in each MS4 annual report.

1.2 Applicable Regulatory Mechanisms and Assessment Procedure

The following bylaws/ordinances, rules & regulations, policies, and/or design standards address any hinderances to using green infrastructure for stormwater management in Shrewsbury:

- Zoning Bylaw
- Rules and Regulations Governing the Subdivision of Land (Subdivision Rules & Regulations)

- Stormwater Management Rules & Regulations

Each regulatory mechanism listed above was reviewed using the matrix included in Attachment A. The mechanisms were reviewed using a list of key questions in four categories, and the degree to which each mechanism addresses a key question was rated as Conventional, Better, or Best using a system based on the Local Bylaw and Regulation Assessment Tool developed by MassAudubon and other guidance documents for regulatory review provided by EPA¹. The definition for each rating is as follows:

- Conventional: The key question is not addressed, or no flexibility is allowed in design requirements.
- Better: The key question is addressed, and some flexibility is allowed in design requirements, usually by special permit. LID design practices and green infrastructure are encouraged but not required.
- Best: The key question is addressed, and flexibility in design is allowed by-right. LID practices and green infrastructure are required or incentivized.

The results of this analysis are summarized in Section 2.0. Recommended updates to the assessed regulatory mechanisms are included in Section 3.0, and a proposed timeline for implementing those updates is presented in Section 4.0.

¹ Supporting LID in Your Community, Local Bylaw and Regulation Assessment Tool, MassAudubon, 2017. <https://www.epa.gov/npdes-permits/stormwater-tools-new-england#pcsm>

2.0 REVIEW OF REGULATORY MECHANISMS

The matrix included in Attachment A was used to review how the Town's regulatory mechanisms and design standards address the use of green infrastructure and low impact development (LID) practices in Shrewsbury in the following categories:

- Provisions for Use of Green Infrastructure Stormwater Management Practices
- Rainwater Harvesting
- Green Roofs
- Preservation of Natural Areas and Limits of Disturbance

This section summarizes the results of the analysis for each category.

2.1 Category 1: Provisions for Use of Green Infrastructure

Category 1 includes key questions such as if bioretention areas are allowed to count toward landscaping requirements, if vegetated open channels are allowed for stormwater conveyance, or if any incentives are provided for incorporating green infrastructure into development or redevelopment designs. Language relating to the use of green infrastructure is included in the Zoning Bylaw and Stormwater Management Rules & Regulations.

Curb Bump-Outs – Use and Allowable Materials

This section was rated “conventional” since there is no language explicitly allowing or prohibiting curb bump-outs or specifying whether bioretention can be installed in curb bump-outs.

Stormwater Design Standards Promote LID

This section was rated “best” as the use of LID strategies is required in planned residential development and shall be in accordance with the most recent edition of Massachusetts Stormwater Management Policy. The use of LID strategies is not mentioned for other types of development.

Curb Buffer Strip – Use and Allowable Materials

This section was rated “conventional” due to the requirement to loam and seed the area between the curb and sidewalk. The use of green infrastructure techniques in this strip is not explicitly allowed or prohibited.

LID Features Allowable By-Right

This section was rated “best” due to the requirement to use green infrastructure/LID techniques in the overall design of development sites and stormwater management systems.

Allowable Uses of Permeable Pavement

This section was rated “better” since permeable pavement is preferred if areas of open space are to be paved in planned residential development areas.

Use of LID to Meet Landscaping Requirements

This section was rated “conventional” since there is no language explicitly allowing or prohibiting LID or green infrastructure practices from counting toward the required landscaping on a development site.

Use of LID Practices Toward Tree Planting Requirements

This section was rated “conventional” since there is no language allowing or prohibiting stormwater BMPs from counting toward a site’s tree planting requirements.

Incentives to Adopt Green Infrastructure

This section was rated “better” because, while there are no incentives in place to adopt green infrastructure or LID practices, green infrastructure and LID are required to be incorporated into site design.

Incentives for Filtering Runoff Using Vegetation

This section was rated “conventional” since there is no language in place that offers incentives for filtering stormwater runoff using vegetation.

Vegetated Open Channel Conveyances

This section was rated “conventional” since there is no language allowing or prohibiting vegetated open channel conveyance of stormwater.

Requirement to Use Native, Less-Water Intensive Vegetation

This section was rated “best” since landscaping plans emphasize the use of native plants that require low maintenance, are resistant to insect infestations, drought, disease, roadside salt, urban conditions, auto emissions, and are suitable for growing conditions in Shrewsbury.

2.2 Category 2: Rainwater Harvesting

Category 2 includes key questions such as whether rainwater harvesting is allowed, where rainwater capture systems can be located, and if stormwater is allowed to be repurposed for non-potable uses. Rainwater harvesting is not included in any of the Town’s regulatory mechanisms.

Roof Downspout Discharge Location

This section was rated “conventional” since there is no language allowing or prohibiting downspouts discharging into rain barrels or yards.

Rain Barrel Use, Placement, and Maintenance

This section was rated “conventional” since there is no language in any of the reviewed regulatory mechanisms discussing the use or placement of rain barrels or cisterns.

Rainwater Harvesting for Non-Potable Use

This section was rated “conventional” since there is no language explicitly allowing or prohibiting the harvesting of rainwater for non-potable uses.

2.3 Category 3: Green Roofs

Category 3 includes key questions such as if green roofs are explicitly allowed or prohibited and, if allowed, what design standards are in place for green roofs. The only language relating to green roofs in the reviewed regulatory mechanisms can be found in the Zoning Bylaw.

Use of Green Roofs

This section was rated “better” since green roofs are allowable in the Route 20 Overlay District if addressed in an application for Site Plan Approval.

Design Standards for Green Roofs

This section was rated “conventional” since there are no design standards in place for green roofs, nor is there a reference to state-issued design standard for green roofs.

Incentives for Green Roof Installation

This section was rated “conventional” since there is no language relating to incentives for the installation of green roofs in any of the reviewed regulatory mechanisms.

2.4 Category 4: Preservation of Natural Areas/Limits of Disturbance

Category 4 includes key questions such as if the community has an open space residential development bylaw, if there is a natural resource protection zoning district, and what restrictions are placed on development within or close to riparian or wetland buffer areas. Language relating to overlay districts and additional design standards are included in the Zoning Bylaw. Language relating to limits of disturbance and buffer requirements is included in the Subdivision Rules & Regulations.

Presence of Open Space Residential Development or Natural Resource Protection Zoning District

This section was rated “best” since Shrewsbury has an Aquifer Protection Overlay District and Flexible Development Overlay District. Shrewsbury also has open space development site design requirements and cluster site design requirements.

Allowances/Incentives for Flexible Site Design

This section was rated “better” since there are allowances for flexible site design – as well as specific site design requirements – in cluster development, but there is no established incentive for using flexible site design.

Minimum and Maximum Yard Sizing

This section was rated “better” since rear and side yards have maximum size requirements, while front yards only have a minimum size requirement.

Vegetated Areas on Site Plans

This section was rated “best” since all site plans are required to show the extents of existing vegetated areas.

Stream Buffer or Floodplain Requirements

This section was rated “best” due to the existing limitations on activities within 100 feet of water and wetland resources. These restrictions are consistent with state regulatory requirements.

Conservation Easements for Buffer Areas

This section was rated “conventional” since there is no language establishing formal conservation easements in buffer areas, only language restricting development and disturbances.

Minimum Required Wetland Buffer

This section was rated “best” due to the existing 100 feet minimum wetland buffer, which is consistent with the Wetlands Protection Act. Shrewsbury does not have their own Wetlands Protection Regulations.

Environmentally Critical Areas on Site Plans

This section was rated “conventional” since there is no language requiring environmentally critical areas be identified on existing condition plans.

Limits on Disturbance of Existing Vegetation and Requirements for Phased Disturbance

This section was rated “better” since extensive topographic changes that involve removing vegetation and trees is to be minimized in cluster development. Cluster site design must preserve general disturbance to the landscape.

Reestablishing Vegetation in Disturbed Open Space

This section was rated “better” since there is language requiring that vegetation be reestablished while restoring excavated areas. However, there is no language specific to reestablishing disturbed open space.

Limiting Site Design to Areas of Lesser Slope and Farther from Watercourses

This section was rated “best” since there is language prohibiting residential development in primary conservation areas and secondary conservation areas, which include areas of natural landscape with steep slope.

3.0 RECOMMENDED REGULATORY UPDATES

This section includes recommended regulatory updates identified as a result of the analysis summarized in Section 2.0. The recommended language will update Shrewsbury's regulatory mechanisms to meet the following goals:

- Allow and encourage green roofs,
- Allow and encourage infiltration practices and green infrastructure techniques to manage stormwater using landscaping and augmented soils,
- Allow and encourage rain barrels and cisterns to promote the use of stormwater for non-potable uses, and
- Allow for flexible site design in line with open space/cluster development practices².

The updates recommended in this section will be implemented in the timeframes included in Section 4.0 to the extent feasible.

3.1 Updates to Zoning Bylaw

The following updates to the Zoning Bylaw should be considered to meet the goals outlined above:

- Update Section VII to explicitly allow green infrastructure and LID practices to count towards landscaping requirements.
- Update Section VII to explicitly allow vegetated stormwater treatment structures and low-impact development practices in setback and buffer areas.
- Update the Table II in Section VII to set maximum as well as minimum yard sizes.
- Update Section VII to require environmentally critical/constrained areas to be identified as part of the existing conditions.
- Update Section VII to set a maximum amount of open space disturbance, or to require projects requiring larger disturbances to phase disturbances during construction. Also update this section to explicitly require disturbed open space to be reestablished as part of the proposed development.

² Development in which the buildings and associated roadways or parking are clustered together in one or more groups separated from adjacent property and/ or other groups within the development by intervening Dedicated Open Space usable for passive or active recreational activities (760 CMR 59.00). Massachusetts provides a model open space design/natural resource protection zoning bylaw, which emphasizes designing around the natural landscape and preserving common open space within subdivisions. This model bylaw is part of the Commonwealth's Smart Growth/Smart Energy Toolkit:

[https://www.mass.gov/files/documents/2017/11/03/Open%20Space%20Design%20\(OSD\)-Natural%20Resource%20Protection%20Zoning%20\(NRPZ\)_0.pdf](https://www.mass.gov/files/documents/2017/11/03/Open%20Space%20Design%20(OSD)-Natural%20Resource%20Protection%20Zoning%20(NRPZ)_0.pdf)

3.2 Updates to Rules and Regulations Governing the Subdivision of Land

The following updates to the Rules and Regulations Governing the Subdivision of Land should be considered to meet the goals outlined above:

- Update Section IV to explicitly allow the installation of green infrastructure and LID practices in traffic calming measures like bump-outs, medians, and traffic islands.
- Update Section IV.B to allow green infrastructure and LID practices to be installed in curb buffer strips.
- Update Section IV to allow permeable pavement to be included in design standards.
- Update Section IV to explicitly allow green infrastructure and LID practices, such as bioretention areas, and other stormwater treatment structures to count toward landscaping and tree planting requirements.
- Update Section IV to explicitly allow roof runoff to be diverted into a rain barrel or cistern. Also update this section to allow rain barrels and cisterns to be placed within setbacks for rainwater harvesting. This section should also require maintenance plans for all rainwater harvesting systems.
- Update Section IV to allow harvested rainwater to be reused for non-potable uses.
- Update Section IV to explicitly allow and/or encourage the installation of green roofs in all zoning districts and set design standards for green roofs.

3.3 Updates to Stormwater Management Rules & Regulations

No updates to the Stormwater Management Rules & Regulations were identified as part of this analysis.

4.0 IMPLEMENTATION TIMEFRAMES FOR REGULATORY UPDATES

Under Section 2.3.6.b. of the 2016 Massachusetts MS4 Permit, the Town of Shrewsbury shall implement recommended updates to their regulatory mechanisms included in this report in the timeframes outlined in this section. The timeframes reflect the regular meeting schedule of the relevant Town departments and boards, and consider any other planned updates to the regulatory mechanisms. Implementation timeframes for the recommended updates to each document are summarized in Table 4.1.

Table 4.1: Implementation Timeframes for Regulatory Updates					
Regulatory Mechanism	Appropriate Review Board	Complete First Draft of Updates	Complete Internal Review	Present Updates to Appropriate Review Board	Adopt Proposed Changes
Zoning Bylaw	Zoning Board of Appeals	Spring 2023	Fall 2023	Spring 2024	Fall 2024
Rules and Regulations Governing the Subdivision of Land	Planning Board	Spring 2023	Fall 2023	Spring 2024	Fall 2024

ATTACHMENT A REGULATORY REVIEW MATRIX

Town of Shrewsbury MS4 Permit Compliance							
Green Infrastructure Report - Regulatory Review Matrix							
Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Stormwater/LID Bylaw/Rules and Regs		Score - See Next Tab
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Category 1: Adopt Green Infrastructure Stormwater Management Provisions							
Are curb bump-outs allowed? Can bioretention be installed in bump-outs?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Do stormwater design standards promote piping and surficial retention or LID?	VII. Development of Sites and Location of Buildings and Structures Q. Planned Residential Development	"The use of Low Impact Development techniques, , is required. Drainage design shall be in accordance with the most recent edition of Massachusetts Stormwater Management Policy standard."		Not mentioned.		Not mentioned.	Best
Can GI techniques replace grass strips between the sidewalk and curb?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Can LID features be easily sited or do they require a waiver?		Not mentioned.		Not mentioned.	Section 18a. Design Requirements	"The Post-Construction Stormwater Management Plan shall be designed to be consistent with, or more stringent than, the requirements of the 2008 Massachusetts Stormwater Handbook; AND low impact development ("LID") site planning and design strategies must be implemented unless infeasible in order to reduce the discharge of stormwater from development sites"	Best
Is permeable pavement allowed? For what uses?	VII. Development of Sites and Location of Buildings and Structures Q. Planned Residential Development	"The Planning Board may authorize up to 5% of the open space to be paved or built upon, preferably using permeable pavement and other means of retaining natural hydrology, for structures accessory to the use or uses of such open space"		Not mentioned.		Not mentioned.	Better
Can bioretention areas and other stormwater practices count as landscaping areas?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Can bioretention areas, tree boxes, and other BMPs count toward tree planting requirements?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are any incentives in place to adopt green infrastructure?		Not mentioned.		Not mentioned.		Not mentioned.	Better
Are any incentives provided for using vegetation to filter stormwater runoff?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Is vegetated open channel conveyance of stormwater allowed? Are there established design criteria for vegetated channels?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are landscaping plans required to use less-water intensive, native vegetation?	VII. Development of Sites and Location of Buildings and Structures Q. Planned Residential Development	"the landscaping plan shall emphasize the use of native plant materials and landscape elements that require low maintenance, are resistant to insect infestations, drought, disease, roadside salt, urban conditions, and auto emissions, and are suitable for growing conditions in Shrewsbury"		Not mentioned.		Not mentioned.	Best
Category 2: Rainwater Harvesting							
Are downspouts allowed to be disconnected into a rain barrel or yard?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional

Town of Shrewsbury MS4 Permit Compliance							
Green Infrastructure Report - Regulatory Review Matrix							
Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Stormwater/LID Bylaw/Rules and Regs		Score - See Next Tab
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Can rain barrels be placed within standard zoning setback areas?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Can cisterns be placed on rooftops for rainwater harvesting?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are maintenance plans required for rainwater harvesting systems?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are site designs allowed to include systems that use stormwater for non-potable uses?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Category 3: Green Roofs							
Do any regulations explicitly allow or prohibit green roofs?	VII. Development of Sites and Location of Buildings and Structures N. Route 20 Overlay District	Allow - in Route 20 Overlay District. Needs to be addressed in application for Site Plan Approval.		Not mentioned.		Not mentioned.	Better
Are there design standards for green roofs? Do they defer to the MA State Building Code per MA Stormwater Handbook guidance?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are there any incentives in place for installing green roofs?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Category 4: Preservation of Natural Areas/Limits of Disturbance							
Does the community have a bylaw or zoning district specifically for open space residential development or natural resource protection?		Aquifer Protection Overlay District and Flexible Development Overlay District. Open space development site design requirements and cluster site design requirements.		Not mentioned.		Not mentioned.	Best
Are there allowances for flexible site design incentives for open space or cluster design?	VII. Development of Sites and Location of Buildings and Structures J. Cluster Development	Cluster design is allowed but there are no incentives. 40% of space in cluster design must be open space - there is a design standard for open space within cluster design areas.		Not mentioned.		Not mentioned.	Better
Presence of maximum as well as minimum yard sizing?	VII. Development of Sites and Location of Buildings and Structures B. Area, Frontages, Yard and Lot Coverage Requirements	Yes. Rear and side yard have maximum and minimum, but front yard just has a minimum.		Not mentioned.		Not mentioned.	Better
Are site plans required to show the extents of existing vegetated areas?		Not mentioned.	Section III - Procedure for the Submission and Approval of Plans	Definitive plan must include: location of trees and grass plots, easements, location of waterways and water bodies, and an environmental analysis		Not mentioned.	Best

Town of Shrewsbury MS4 Permit Compliance							
Green Infrastructure Report - Regulatory Review Matrix							
Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Stormwater/LID Bylaw/Rules and Regs		Score - See Next Tab
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
Are there stream buffer or floodplain requirements? Are they consistent with state regulatory requirements?		Not mentioned.	Section III - Procedure for the Submission and Approval of Plans	"If located within the Floodplain District, the location of the base flood elevation (one hundred year flood) shall be indicated. Wetlands delineation shall be based upon field identification and flagging by a botanist qualified for wetlands identification under the Wetlands Protection Act. It is recommended that the wetlands identification be done in coordination with the Conservation Commission."		Not mentioned.	best
What is the minimum required wetland buffer?		Not mentioned.	Section III - Procedure for the Submission and Approval of Plans	Any person submitting a subdivision for approval by the Board, said subdivision to be built within 100 feet of any of the resource areas listed under said M.G.L. Chapter 131 s. 40, shall file for a permit with the Shrewsbury Conservation Commission to perform such work under the Wetlands Protection Act. This permit must be obtained before any development work commences.		Not mentioned.	Best
Are environmentally critical/constrained areas required to be identified as part of the existing conditions plan?		Not mentioned.		Not mentioned.		Not mentioned.	Conventional
Are there limits on allowable disturbance of existing vegetation? Is disturbance of vegetated areas required to be phased?	VII. Development of Sites and Location of Buildings and Structures J. Cluster Development	"Extensive topographic changes necessitating vegetation and tree removal are minimized. The site design shall preserve and, where possible, enhance the natural features of the property, including scenic views, by adapting the location and placement of structures, if any are approved, and ways to the existing topography in 97 order to minimize the amount of soil removal, tree cutting and general disturbance to the landscape and surrounding properties."		Not mentioned.		Not mentioned.	Better
Is there a requirement to reestablish vegetated areas in disturbed open space?	VII. Development of Sites and Location of Buildings and Structures H. Earth Removal	In restoring the excavated areas, the existing topsoil shall be spread to a depth of four (4) inches upon which the owner shall develop a satisfactory growth of vegetation.		Not mentioned.		Not mentioned.	Better
Is there any language requiring limiting site designs to areas of lesser slope and/or farther from watercourses?		"The final grading, upon completion of the gravel removal operations, must provide an aesthetically pleasing relationship to the abutting properties and grades which will provide adequate drainage (0.5% minimum) to an approved outlet." and Open Space Use and Design Standard (p.97): "Common land is arranged to protect valuable natural environments such as stream valleys, outstanding vegetation, or scenic views, and to avoid development on hazardous areas such as flood plains and steep slopes"		Not mentioned.		Not mentioned.	Best

Town of Shrewsbury MS4 Permit Compliance							
Green Infrastructure Report - Regulatory Review Matrix							
Key Question	Zoning Bylaw/Ordinance		Subdivision Rules & Regulations		Stormwater/LID Bylaw/Rules and Regs		Score - See Next Tab
	Section Reference	Language	Section Reference	Language	Section Reference	Language	
	VII. Development of Sites and Location of Buildings and Structures Q. Planned Residential Development	<p>Special Permit for Open Space Development: "A conservation analysis of the site proposed for a PRD. The conservation analysis shall identify and delineate primary conservation areas, such as wetlands, riverfront areas, and floodplains regulated by state or federal law. Development shall be prohibited within primary conservation areas. The analysis shall also identify secondary conservation areas, including unprotected elements of the natural landscape such as steep slopes, mature woodlands, prime farmland, meadows, wildlife habitats, and cultural features such as historic and archaeological sites and scenic views. Land outside the primary and secondary conservation areas identified in the analysis shall be the potentially developable area of the site. It shall be the applicant's burden to demonstrate that the proposed locations of buildings and roads are within the potentially developable area of the site." "The final grading, upon completion of the gravel removal operations, must provide an aesthetically pleasing relationship to the abutting properties and grades which will provide adequate drainage (0.5% minimum) to an approved outlet." and Open Space Use and Design Standard (p.97): "Common land is arranged to protect valuable natural environments such as stream valleys, outstanding vegetation, or scenic views, and to avoid development on hazardous areas such as flood plains and steep slopes"</p>					